

PTO 1390 Page 1 of 1

US Dept. of Commerce Pat. &amp; Trademark Office

Attorney's Docket No.

21927

TRANSMITTAL LETTER TO THE UNITED STATES  
DESIGNATED/ELECTED OFFICE (DO/EO/US)  
CONCERNING A FILING UNDER 35 USC 371

US. Application No. (if known)

097890372

INTERNATIONAL APP. NO.

PCT/EP00/00444 ✓

INTERNATIONAL FILING DATE

21 January 2000 ✓

PRIORITY DATE CLAIMED

28 January 1999 ✓

TITLE OF INVENTION

DEVICE FOR SHRINKING A SHRINK-WRAP FILM ✓

APPLICANT(S) FOR DO/EO/US

Reiner HANNEN ✓ et al

Applicant herewith submits to the United States Designated/Elected Office (DO/EU/US) the following .

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 USC 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 USC 371.
3. ☐ This is an express request to begin national examination procedures (35 USC 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 USC 317(b) and PCT Articles 22 and 39(1).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 USC 371(c)(2)).
  - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau.
  - b. ☐ has been transmitted by the International Bureau.
  - c. ☐ is not required, as the application was filed in the United States Patent Office.
6. ☒ A translation of the International application into English.
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 USC 371(c)(3)).
  - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau.
  - b. ☐ have been transmitted by the International Bureau.
  - c. ☐ have not been made; however the time limit for making such amendments has NOT expired.
  - d. ☐ have not been made and will not be made.
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 USC 371(c)(3).
9. ☐ An oath or declaration of the inventor(s) (35 USC 371(c)(4).
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 USC 371(c)(5)).

## Items 11. to 16. below concern documents or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. ☐ An Assignment for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☒ A **FIRST** preliminary amendment.  
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.
16. ☒ Other items of information.  
Drawing (2 sheets)  
References  
PTO-1449

09/890372

PCT/EP00/00444

21927

## 17. The following fees are submitted:

Basic National Fee (37 CFR 1.492(a)(1)-(5):

Search report has been prepared by the EPO or JP ..... \$860.00

Int'l prel. exam. fee paid to USPTO (37 CFR 1.482) ..... \$690.00

No int'l prel. exam. fee paid to USPTO (37 CFR 1.482)

but int'l search fee paid to USPTO (37 CFR 1.445(a)(2)) ..... \$710.00

Neither int'l prel. exam fee (37 CFR 1.482) nor

int'l search fee (37 CFR 1.455(a)(2)) paid to USPTO ..... \$1000.00

Intl. prel. exam. fee paid to USPTO (37 CFR 1.482)

and all claims satisfied provisions of PCT Art. 33(2-4) ..... \$100.00

ENTER APPROPRIATE BASIC FEE AMOUNT

Surcharge of \$130.00 for furnishing oath or declaration later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(e)).

CLAIMS	NO. FILED	NO. EXTRA	RATE
Total claims	7	0	\$18
Ind. claims	0	0	\$80
MULTIPLE DEP. CLAIM(S) (if applicable) (see prel. amt.)			270

TOTAL OF ABOVE CALCULATIONS

Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement  
must also be filed (37 CFR 1.2, 1.27, 1.28)

SUBTOTAL

Processing fee of \$130.00 for furnishing the English translation later than ☐ 20 ☐ 30  
months from the earliest claimed priority date (37 CFR 1.492(f)).

TOTAL NATIONAL FEE

Fee for recording the enclosed assignment (37 CFR 1.21(h)). The Assignment may be  
accompanied by an appropriate PTO-1595 cover sheet (37 CFR 3.28, 3.39)

TOTAL FEES ENCLOSED

CALCULATIONS PTO USE ONLY

\$1,000

\$1,000

\$500

\$500

\$500

Amt to be refunded

Amt to be  
charged

- a. ☐ A check in the amount of \$ to cover the above fees is enclosed
- b. ☐ Please charge my deposit account 18-2025 \$ to cover the above fees. A copy of this sheet is enclosed.
- c. ☒ Please charge the amount due to the credit card identified in the attached PTO-2038.
- d. ☒ The commissioner is authorized to charge any additional fees which may be required or credit any overpayment to deposit  
account 18-2025. A copy of this sheet is enclosed
- e. A PTO-2038 in the amount of \$ to cover recordal of the Assignment is enclosed

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive  
(37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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21927

IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor                    Reiner HANNEN et al  
Patent App.                Not known (US Nat'l phase of PCT/EP00/00444)  
Filed                      Concurrently herewith  
For                        DEVICE FOR SHRINKING A SHRINK-WRAP FILM  
Art Unit                    Not known  
Hon. Commissioner of Patents  
Washington, DC 20231

PRELIMINARY AMENDMENT

Prior to examination of the above-identified application,  
please amend as follows:

In the translation serving as Specification:

Page 1, between lines 1 and 2 insert

--

CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase  
of PCT application PCT/EP00/00444 filed 21  
January 2000 with a claim to the priority of  
German patent application 299 01 423.1 itself  
filed 28 January 1999 and German patent appli-  
cation 299 05 931.6 itself filed 1 April 1999.

FIELD OF THE INVENTION

--.

In the revised claims:

Cancel all the claims in the case, namely claims 1 through 4. (The case originally contained claims 1 through 6 but they were replaced with claims 1 through 4 as shown in the translation of the revised pages.)

Add the following claims:

1       --           5. An apparatus for shrinking a foil wrapped about a  
2 stack of objects and projecting vertically past an end of the  
3 stack, the apparatus comprising:

4               a frame extending vertically adjacent the stack;  
5               means including a heater vertically displaceable on the  
6 frame and directed at the wrapped stack for shrinking the foil  
7 thereabout;

8               a nozzle centered vertically on the stack and having an  
9 annular array of outlets directed generally vertically and out-  
10 wardly at the end of the stack; and

11              means for supplying a gas under pressure to the nozzle  
12 for directing respective jets of the gas from the openings at the  
13 foil extending past the end for erecting the foil extending past  
14 the end.

1               6. The foil-shrinking apparatus defined in claim 5  
2 wherein the nozzle has an annular face extending at an acute angle  
3 the end face and formed with the outlets.

1               7. The foil-shrinking apparatus defined in claim 5  
2 wherein the face and outlets extend at an angle of about 45° to a  
3 vertical centerline of the stack.

1           8. The foil-shrinking apparatus defined in claim 5,  
2 further comprising  
3           means for vertically moving the nozzle toward and away  
4 from the stack.

1           9. The foil-shrinking apparatus defined in claim 5  
2 wherein the end is the upper end and the stack has a lower end past  
3 which the foil also extends, the apparatus further comprising:  
4           a second such nozzle connected to the means and directed  
5 at the lower end for erecting the foil extending therepast.

1           10. The foil-shrinking apparatus defined in claim 5,  
2 further comprising:  
3           means for pressing the foil against the stack as the foil  
4 is shrunk around the stack.

1           11. The foil-shrinking apparatus defined in claim 10,  
2 further comprising  
3           means including a lift table for raising the pressing  
4 means.

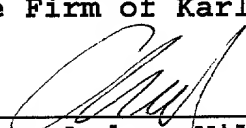
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Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The translated claims have been replaced with US-style claims.

Respectfully submitted,  
The Firm of Karl F. Ross P.C.

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by: Andrew Wilford, 26,597  
Attorney for Applicant

17 July 2001

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13 Rec'd PCT/PTO 28 SEP 2001  
09/890372

Certificate of Transmittal  
I hereby certify that this paper is being transmitted by  
facsimile to the United States Patent and Trademark  
Office on the following date:

21927

IN THE U.S. PATENT AND TRADEMARK OFFICE

Inventor	Reiner HANNEN et al	
Patent App.	Not known (US Nat'l phase of PCT/EP00/00444)	
Filed	Concurrently herewith	
For	DEVICE FOR SHRINKING A SHRINK-WRAP FILM	
Art Unit	Not known	Att: Winston Alvarado
Hon. Commissioner of Patents		
Washington, DC 20231		

## SUBSTITUTE PRELIMINARY AMENDMENT

Prior to examination of the above-identified application,  
please amend as follows:

In the translation serving as Specification:

Page 1, between lines 1 and 2 insert

## -- CROSS REFERENCE TO RELATED APPLICATIONS

This application is the US national phase  
of PCT application PCT/EP00/00444 filed 21  
January 2000 with a claim to the priority of  
German patent application 299 01 423.1 itself  
filed 28 January 1999 and German patent appli-  
cation 299 05 931.6 itself filed 1 April 1999.

FIELD OF THE INVENTION --

09890372-2



Atty's 21927

Pat. App. Not known - US phase of PCT/EP00/00444

In the revised claims:

Cancel all the claims in the case.

Add the following claims:

Atty's 21927

Pat. App. Not known - US phase of PCT/EP00/00444

1    --           7. An apparatus for shrinking a foil wrapped about a  
2    stack of objects and projecting vertically past an end of the  
3    stack, the apparatus comprising:  
4            a frame extending vertically adjacent the stack;  
5            means including a heater vertically displaceable on the  
6    frame and directed at the wrapped stack for shrinking the foil  
7    thereabout;  
8            a nozzle centered vertically on the stack and having an  
9    annular array of outlets directed generally vertically and out-  
10   wardly at the end of the stack; and  
11           means for supplying a gas under pressure to the nozzle  
12   for directing respective jets of the gas from the openings at the  
13   foil extending past the end for erecting the foil extending past  
14   the end.

1           8. The foil-shrinking apparatus defined in claim 7  
2   wherein the nozzle has an annular face extending at an acute angle  
3   the end face and formed with the outlets.

1           9. The foil-shrinking apparatus defined in claim 7  
2   wherein the face and outlets extend at an angle of about 45° to a  
3   vertical centerline of the stack.

Atty's 21927

Pat. App. Not known - US phase of PCT/EP00/00444

1           10. The foil-shrinking apparatus defined in claim 7,  
2 further comprising  
3           means for vertically moving the nozzle toward and away  
4 from the stack.

1           11. The foil-shrinking apparatus defined in claim 7  
2 wherein the end is the upper end and the stack has a lower end past  
3 which the foil also extends, the apparatus further comprising:  
4           a second such nozzle connected to the means and directed  
5 at the lower end for erecting the foil extending therepast.

1           12. The foil-shrinking apparatus defined in claim 7,  
2 further comprising:  
3           means for pressing the foil against the stack as the foil  
4 is shrunk around the stack.

1           13. The foil-shrinking apparatus defined in claim 12,  
2 further comprising  
3           means including a lift table for raising the pressing  
4 means.

Atty's 21927


Pat. App. Not known - US phase of PCT/EP00/00444

Remarks:

This amendment is submitted in an earnest effort to advance this case to issue without delay.

The translated claims have been replaced with US-style claims.

Respectfully submitted,  
The Firm of Karl F. Ross P.C.

  
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28 September 2001

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2/PR75

09/890372  
JC18 Rec'd PCT/PTC 26 JUL 2001

21927 PCT/EP00/00444

Transl. of WO 00/44626

Apparatus for Shrinking a Heat-shrink Foil

The invention relates to an apparatus for shrinking a heat-shrink foil in particular wrapped around a palletted stack of objects.

5           Such heat-shrink foils are used nowadays in order, for example, to secure objects for example to a pallet for transport. To this end a heat-shrink foil is wrapped around the stack of objects so that the heat-shrink foil does not slip down. This is done either directly in a shrink station or in a separate station  
10 upstream of the shrink station.

15           In the shrink station the heat-shrink foil is blasted by the shrink device with hot gas so that the heat-shrink foil is heated to its shrink temperature and is shrunk so as to pull together around the stack of objects. The shrink device is thus movable vertically up and down so that shrinking can take place from top to bottom or from bottom to top. During shrinking air is  
20 blow partially on the stack of objects from above.

25           US patent 4,616,471 describes an apparatus for shrinking a heat-shrink foil forming a hood over a palletted object stack that is formed of at least one shrink device movable vertically up and down on a frame, the heat-shrink foil projecting past the lower face of the object stack.

30           A disadvantage is that this apparatus cannot produce a fold-free shrinking of the portion of the heat-shrink foil that projects above the top of the stack of objects so that for example a packing slip on the upper side of the stack of objects between the stack of objects and the heat-shrink foil, which carries a bar code, cannot be read.

It is an object of the invention to improve on an apparatus of the described type so that shrinking of the portion of the foil projecting upward and/or downward is improved to produce an optimal fold-free shrink.

5 This object is attained by an apparatus for shrinking a heat-shrink foil wrapped in particular about a palletized object stack comprising at least one shrink device movable vertically up and down on a frame to heat and vertically shrink the heat-shrink foil, the heat-shrink foil projecting past the upper and/or lower  
10 edge of the object stack to form an upper and/or lower shrink formation, characterized in that the apparatus further comprises at least one nozzle connectable to a compressed-gas, especially a compressed-air source and aimed centrally above and/or below the object stack and generally vertically directed thereat, each nozzle  
15 having outlet openings that extend at an angle not coinciding with the flow direction inside the nozzle and that are in an annular array.

As a result of the angle of the outlet openings of the nozzles to the flow direction, the compressed air is not blown  
20 perpendicularly against the upper face of the object stack. Rather the compressed air is directed either obliquely against the upper surface and is there deflected against the projecting part of the foil, or -- so long as the outlet openings open generally at a 90° angle to the flow direction inside the nozzle -- is blown directly  
25 against the projecting foil part. As a result the projecting foil part is held up during the upper shrink phase so that it is uniformly heated by the shrink device during this upper shrink phase.

## Apparatus for Shrinking a Heat-shrink Foil

The invention relates to an apparatus for shrinking a heat-shrink foil in particular wrapped around a palletted stack of objects.

5        Such heat-shrink foils are used nowadays in order, for example, to secure objects for example to a pallet for transport. To this end a heat-shrink foil is wrapped around the stack of objects so that the heat-shrink foil does not slip down. This is done either directly in a shrink station or in a separate station  
10       upstream of the shrink station.

15       In the shrink station the heat-shrink foil is blasted by the shrink device with hot gas so that the heat-shrink foil is heated to its shrink temperature and is shrunk so as to pull together around the stack of objects. The shrink device is thus movable vertically up and down so that shrinking can take place from top to bottom or from bottom to top. During shrinking air is blow partially on the stack of objects from above.

20       A disadvantage is that this apparatus cannot produce a fold-free shrinking of the portion of the heat-shrink foil that projects above the top of the stack of objects so that for example a packing slip on the upper side of the stack of objects between the stack of objects and the heat-shrink foil, which carries a bar code, cannot be read.

It is an object of the invention to improve on an apparatus of the described type so that shrinking of the portion of the foil projecting upward and/or downward is improved to produce an optimal fold-free shrink.

5 This object is achieved by an apparatus for shrinking a heat-shrink foil wrapped in particular about a palleted object stack comprising at least one shrink device movable vertically up and down on a frame to heat and vertically shrink the heat-shrink foil, the heat-shrink foil projecting past the upper and/or lower  
10 edge of the object stack to form an upper and/or lower shrink formation, and at least one nozzle connectable to a compressed-gas, especially a compressed-air source and aimed centrally above and/or below the object stack, each nozzle having outlet openings that extend at an angle to the flow direction inside the nozzle and that  
15 are in an annular array.

As a result of the angle of the outlet openings of the nozzles to the flow direction, the compressed air is not blown perpendicularly against the upper face of the object stack. Rather the compressed air is directed either obliquely against the upper  
20 surface and is there deflected against the projecting part of the foil, or -- so long as the outlet openings open generally at a 90° angle to the flow direction inside the nozzle -- is blown directly against the projecting foil part. As a result the projecting foil part is held up during the upper shrink phase so that it is uni-  
25 formly heated by the shrink device during this upper shrink phase.



As a result of this uniform heating the projecting foil part shrinks without folds onto the upper side of the object stack.

Preferably each nozzle has a beveled end face in which the outlet openings are provided so that the compressed air is directed at this angle in all directions. The outlet openings extend generally at an angle of 45° to the flow direction in the nozzle.

In order that object stacks of different size can be provided with a shrunk foil in the shrink station, each nozzle is movable up and down. As a result the ideal spacing between the nozzle and the object stack can be set for the height of the object stack and/or the dimension of the upper face of the object stack.

In order to avoid that the unshrunk heat-shrink foil slides downward, it is further provided that the apparatus for securing the heat-shrink foil on the object stack has a pressing device that preferably is mounted on a lift table for lifting the object stack.

In the following an embodiment shown in the drawing is described. Therein:

FIG. 1 is a side view of an apparatus according to the invention;

FIG. 2 is a view through the output part of a nozzle; and

FIG. 3 is a section through the structure of FIG. 2.

In the figures the same reference numerals are used for the same parts.

FIG. 1 shows a shrink station 1 that is formed of a frame 2 and a shrink device 3, e.g. constituted as a ring burner.

5. The frame 2 has two masts 4 arranged next to another in a plane perpendicular to the view plane and of which only the front one is visible in this view. Both masts 4 are connected together at their upper ends by an unillustrated traverse.

10 Each mast 4 carries a vertically movable carriage 5 guided by rollers 6 and 7. The carriages 5 are moved vertically by endless chains 8 looped at the upper and lower ends of the masts 4 over sprockets 9 and 10.

15 A motor 11 provided in the lower region of the masts 4 drives the chains 8, both carriages 5 being moved synchronously so that they are always at the same height.

The carriages 5 are connected together by the shrink device 3 which has a shape corresponding to the footprint of a stack 12 of objects -- in the illustrated example a polygonal frame-like shape -- where the area inside the shrink device 3 is  
20 large enough that it can be moved vertically along the object stack 12.

Such an object stack 12 is underneath the shrink device 3 on a conveyor 13 that is formed for example as a chain, roller, or bar conveyor. The object stack 12 is comprised of a standard  
25 pallet 14 and a stack 15 of objects on it. If objects 15 of substantial size need to be packaged, no pallet 14 is needed.

Underneath the object stack 12 is a lift platform or table 16 on whose upper side a lift ram 17 can engage through an aperture in the conveyor upward between the unillustrated support members of the pallet 14. A suction blower can be provided in the region of the ram 17 and underneath the conveyor 13.

Both above and below the object stack 12 is a nozzle 19 that can also move up and down. Each nozzle 19 is as shown in FIG. 2 of blunt shape and has an annular beveled edge face 20 that extends at an angle of about  $45^\circ$  to the flow direction inside the nozzle 19. Openings 21 in this edge face 20 direct jets of compressed air at an angle at the object stack 12 (arrow 22). As shown in FIG. 3 the outlet openings 21 extend like a star from a supply passage 23 provided centrally in the nozzle 19.

When the compressed air strikes the upper side of the object stack 12 it is deflected as shown by arrows 24 and stands up and holds erect a projecting portion 25 of a heat-shrink foil 26. In addition the compressed air coming from the nozzles 19 directs hot air from the shrink device 3 to the inside of the projecting portion 25. The shrink device 3 is supplied with gas via a supply line 27.

When the nozzles 19 are only as shown provided for upper and lower shrinking, the outlet openings 21 are provided in an annular array around the face 20 as shown in FIG. 3 so that the compressed air moves outward in all directions. If on the contrary several nozzles 19 are provided, the outlet openings 21 of each nozzle 19 are preferably set such that each nozzle 19 directs its

compressed air only at a particular portion of the object stack 12; at the same time the arrangement of the outlet openings 21 among the provided nozzles 19 is selected such that the projecting foil portion 25 of the heat-shrink foil 26 is stood up at every location by the compressed air.

Shrinking with the apparatus according to the invention takes place as follows:

First the object stack 12 is wrapped or wound with the heat-shrink foil 26. This can be done for example at a station upstream from the shrink station 1 or in the shrink station itself. When the wrapping takes place in a separate station the object stack 12 surrounded by the heat-shrink foil 26 is transported by the conveyor 13 to the shrink station 1.

To both sides of the conveyor 13 are standard vertical foil rollers for applying the heat-shrink foil 26, from at least one of which the heat-shrink foil 26 rolls out. The two ends of the heat-shrink foils 26 pulled off the foil rolls are welded together. On passing the foil rolls the object stack 12 is surrounded by the welded-together heat-shrink foils 26, the two heat-shrink foils 26 being joined together at the trailing region with a double weld seam.

Thereafter the heat-shrink foils 26 are cut apart between the two weld seams so that the next object stack 12 can be provided with a heat-shrink foil 26. The heat-shrink foil 26 engages the object stack 12 such that it does not slide down. It is possible to provided the object stack 12 in another manner with the heat-

-shrink foil 26. In the case where the heat-shrink foil 26 is not tight enough on the object stack 12, a compactor 28 is provided on the ram table 16 that presses the heat-shrink foil against the object stack and thus holds it in place.

5. In the shrink station 1 the heat-shrink foil 26 is shrunk by vertical movement of the shrink device 3. It is preferable that the shrinking takes place from top to bottom although shrinking in the opposite direction is possible.

10 In order to achieve a good shrinking in the upper region, that is in order to shrink the foil portion 25 projecting up above the object stack 12, compressed air is blown via the nozzles 19 against the upper surface of the object stack 12. The compressed air engages obliquely down on the object stack 12 (arrow 22) and is deflected thereby back up in the direction of the arrows 24. In  
15 this manner the projecting foil portion 25 is pushed outward and upward so that during the upper shrink phase it is erect and thus is uniformly heated by the hot gas from the shrink device 3.

20 As soon as the projecting foil portion 25 is heated to the shrink temperature, air feed to the nozzle 19 is cut so that the projecting foil 25 portion draws itself over the upper surface of the object stack 12.

25 Thereafter the shrink device 3 is moved downward to shrink the side surfaces of the object stack 12, so that the heat-shrink foil 26 pulls strongly together over the side surfaces of the object stack 12.

If shrinking underneath is desired, that is to engage the lower edge of the heat-shrink foil 26 around the object stack 12 or the pallet 15, the object stack 12 is raised somewhat by the ram 17 of the lifting device 16.

5. Then the shrink device is dropped down to the level of the conveyor 13 by movement of the carriages 5.

Now the lower edge of the heat-shrink foil 26 is acted on by the hot gas of the shrink device 3 so that it is heated to the shrink temperature and thus pulls tight around the lower face of the pallet 14. In order to get a good engagement underneath one also uses at least one nozzle 19.

Thereafter the object stack 12 with a still hot edge of the heat-shrink foil 26 is again set back down on the conveyor 13 so that the hot edge is pressed between the conveyor 13 and the lower surface of the pallet 15 so as to weld together the various layers of this edge. Thus the lower edge of the heat-shrink foil 26 gains an extremely good hold.

After the shrink process is over, the object stack 12 is moved out of the shrink station 1 by the conveyor 13. The above-described process is repeated for a new object stack.

## Claims:

1. An apparatus for shrinking a heat-shrink foil (26) wrapped in particular about a palletted object stack (12) comprising at least one shrink device (3) movable vertically up and down on a frame (2) to vertically heat and shrink the heat-shrink foil (26), the heat-shrink foil (26) projecting past the upper and/or lower edge of the object stack (12) to form an upper and/or lower shrink formation, characterized in that the apparatus further comprises at least one nozzle (19) connectable to a compressed-gas source, especially a compressed-air source and aimed centrally above and/or below the object stack (12) and generally vertically directed thereat, each nozzle (19) having outlet openings (21) that extend at an angle not coinciding with the flow direction inside the nozzle (19) and that are in an annular array.

2. The apparatus according to claim 1, characterized in that each nozzle (19) has a beveled end face (20) in which the outlet openings (21) are provided.

3. The apparatus according to claim 1 or 2, characterized in that the outlet openings (21) extend generally at an angle of 45° to the nozzle (19).

4. The apparatus according to one of claims 1 through 3, characterized in that each nozzle (29) is movable up and down.

5. The apparatus according to one of claim 1 through 4, characterized in that in order to hold the heat-shrink foil (26) on the object stack (12) during shrinking, in particular upper-end shrinking, a pressing device (28) is provided.

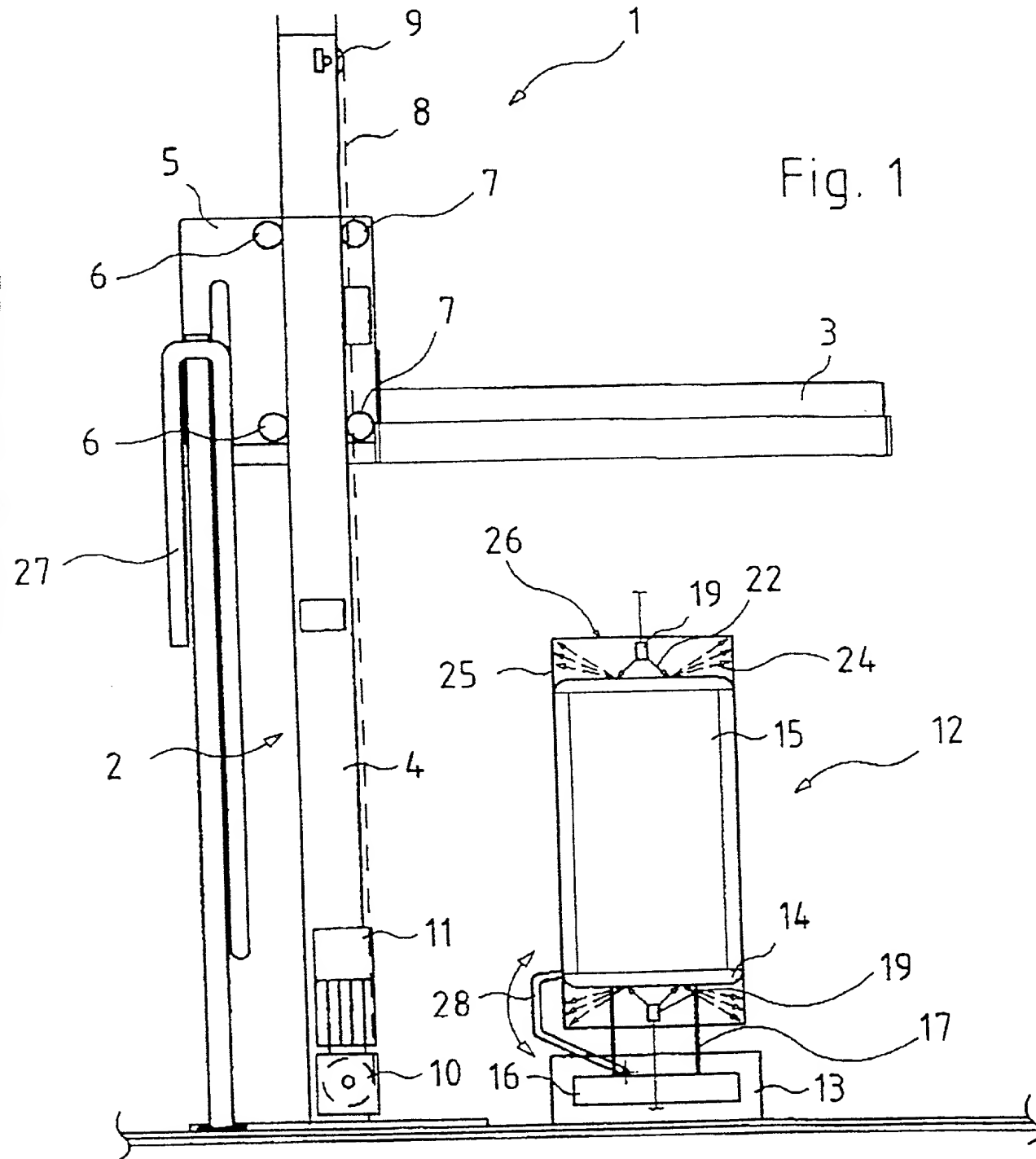
5

6. The apparatus according to claim 5, characterized in that the pressing device (28) is mounted on a lift table (16) for the object stack (12).



## Abstract

The invention relates to an apparatus for shrinking a heat-shrink foil wrapped in particular about a palleted object stack. in order to improve on such an apparatus so that shrinking of the foil part projectingg past upper and/or lower face is  
5 pmproved and produces an optimal fold-free shrinkage, an apparatus for shrining a heat-shrink foil wrapped in particular about a palleted object stack comprises at least one shrink device movable vertically up and down on a frame to heat and shrink the heat-  
10 -shrink foil, the heat-shrink foil projecting past the upper and/or lower edge of the object stack to form an upper and/or lower shrink formation, the apparatus further comprising at least one nozzle connected to a compressed air source and aimed centrally above and/or below the object stack and generally vertically directed  
15 thereat, each nozzle having outlet openings that extend at an angle not coinciding with the flow direction inside the nozzle and that are in an annular array.



2/2

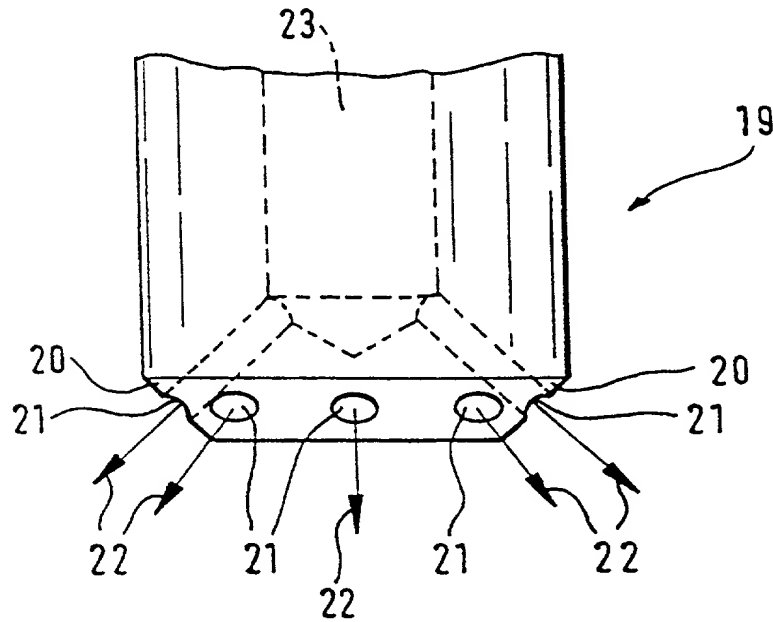


Fig. 2

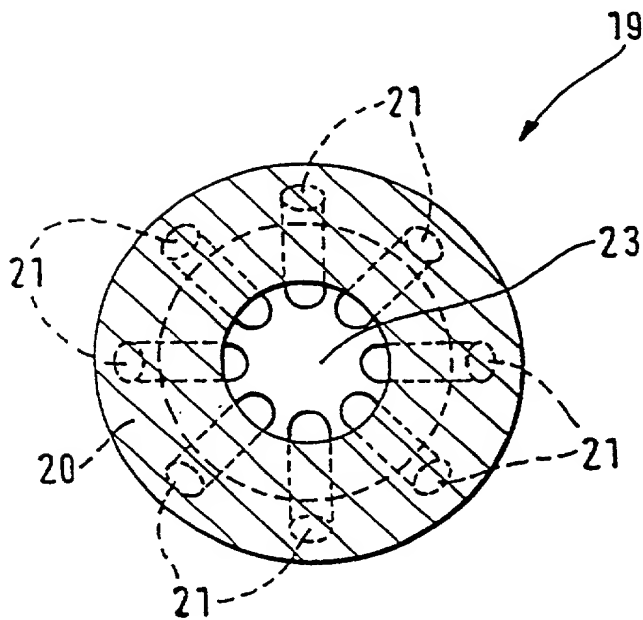


Fig. 3

**DECLARATION AND POWER OF ATTORNEY**

As a below named inventor, I hereby declare that: My residence, post-office address, and citizenship are as stated below next to my name,  
I believe that I am an original joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled

**DEVICE FOR SHRINKING A SHRINK-WRAP FILM**

the specification of which was filed on 21 January 2000 as PCT application PCT/EP00/00444.

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 USC 119 of any foreign applications for patent or inventor's certificate listed below and have also identified below any foreign applications for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

**Prior Foreign Applications**

Country	Number	Filing Date	Priority claimed
DE	29901423.1	28 January 1999	Yes
DE	29905931.6	1 April 1999	Yes

I hereby claim the benefit under 35 USC 120 of the United States Application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States Application(s) in the manner provided by the first paragraph of 35 USC 112, I acknowledge the duty to disclose material information as defined in 37 CFR 1.56 which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

Serial Number	Filing Date	Status
PCT/EP00/00444	21 January 2000	Pending

I hereby appoint as attorneys to prosecute this application and to transact all business connected therewith: Herbert Dubno, Reg. 19,752; Jonathan Myers, Reg. 26,963; Andrew Wilford, Reg. 26,597 and each of them individually.

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or

both, under 18 USC 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

1-00 Full name of first inventor: Reiner HANNEN

Inventor's signature Reiner Hannen Date: 27.07.2001

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Inventor's signature Norbert Vermeulen Date: 27.07.2001

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